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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/783,094

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EXAMINER

UHLENHAKE, JASON S

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/783,094	Applicant(s) WATANABE ET AL.	
	Examiner JASON S. UHLENHAK	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-18 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-18 and 21-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5-8, 12-13, 15, 21, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) in view of Umetani et al (U.S. Pub. 2003/0193539), Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040)

Knierim discloses:

- ***regarding claims 1, 12, 21, 25***, condition storage section being configured and arranged to store an optimal weight and velocity of droplets to be discharged from a discharge head (Abstract; Column 5, Lines 50-61; Column 6, Line 65 – Column 7, Line 5; Column 1, Lines 44-48)
- waveform adjusting section configured and arranged to read basic drive waveform from the basic drive waveform storage section and to adjust the basic drive waveform to an adjusted drive waveform so that the weight that is measured by the weight measuring section and the velocity that is measured by the speed measuring section substantially match the optimal weight and velocity that are stored in the

condition storage section for the adjusted drive waveform (Abstract; Column 4, Lines 45-56; Column 5, Lines 36-61; Column 6, Line 65 – Column 7, Line 5)

- ***further regarding claims 1, 2, 13, 25***, basic drive waveform storage section being configured and arranged to store a basic drive waveform; adjusted waveform storage section being configured and arranged to store the adjusted drive waveform that is adjusted by the waveform adjusting section; (Abstract; Column 4, Lines 45-56; Column 5, Lines 36-61; Column 6, Line 65 – Column 7, Line 5)

- ***further regarding claims 12, 21***, a discharge head configured and arranged to form the liquid material into droplets (Column 3, Lines 35-38); drive control section configured to supply a drive waveform to the discharge head to discharge the droplets (Column 5, Lines 7-11)

- ***regarding claims 2 and 13***, basic drive waveform storage to store a plurality of basic drive waveforms; waveform adjusting section configured and arranged to read basic drive waveform from the basic drive waveform storage section and to adjust the basic drive waveform to an adjusted drive waveform that corresponds to the physical property values acquired by the physical property value acquisition section (Abstract; Column 4, Lines 45-56; Column 5, Lines 36-61; Column 6, Line 65 – Column 7, Line 5)

Knierim et al does not disclose expressly the following:

- ***regarding claims 1, 12, 21, 25***, a weight measuring section being configured and arranged to measure the weight of the droplets having been discharged from the discharge head onto the weight measuring section; a speed measuring section

being configured and arranged to measure the velocity of the droplets in flight having been discharged from the discharge head

- a physical property value acquisition section configured and arranged to acquire physical property values of the droplets discharged from the discharge head, the physical property value acquisition section configured and arranged to acquire at least one of viscosity, surface tension, contact angle, and density as the physical property values of the droplets

- **regarding claim 5**, the physical property value acquisition section includes a measuring section that is configured and arranged to measure at least one of physical property of the droplets

- **regarding claim 6**, weight measuring section comprises: an electrode configured and arranged to face the discharge head; an oscillator configured and arranged to change frequency in accordance with the weight of a substance deposited on an electrode surface; a frequency counter configured and arranged to measure the frequency of the oscillator; calculating section configured and arranged to calculate the weight of the droplets on the basis of the difference in frequency before and after droplet deposition measured with the aid of the frequency counter

- **regarding claim 7**, compute a viscosity of the droplets with aid of an amplitude-damping characteristics of the oscillator when the droplets deposit on the electrode surface

- **regarding claim 8 and claim 15**, the speed measuring section is configured to compute the velocity of the droplets by using the position of the droplets

discharged from the discharge head at two different points in time and using the time difference between these two points in time

Umetani discloses:

- ***regarding claims 1, 12, 21, 25***, a weight measuring section being configured and arranged to measure the weight of the droplets having been discharged from the discharge head onto the weight measuring section (Abstract; Paragraphs 0006, 0060) for the purpose of measuring the amount of ink ejected from the recording head with high accuracy (Paragraph 0001)
- ***regarding claim 6***, an electrode (22) configured and arranged to face the discharge head (Paragraph 0045; Figure 3); an oscillator configured and arranged to change frequency in accordance with the weight of a substance deposited on an electrode surface (Paragraph 0007; Claim 1); a frequency counter configured and arranged to measure the frequency of the oscillator (Paragraph 0060); calculating section (35) configured and arranged to calculate the weight of the droplets on the basis of the difference in frequency before and after droplet deposition measured with the aid of the frequency counter (Paragraph 0047; Claim 8), for the purpose of measuring the amount of ink ejected from the recording head with high accuracy (Paragraph 0001)
- ***regarding claim 7***, compute a viscosity of the droplets with aid of an amplitude-damping characteristics of the oscillator when the droplets deposit on the electrode surface (Paragraphs 0055 – 0056), for the purpose of improving the quality of printing and measuring the amount of ink ejected from the recording head with high accuracy.

Arakawa discloses:

- ***regarding claims 1, 12, 21, 25***, a speed measuring section being configured and arranged to measure the velocity of the droplets in flight having been discharged from the discharge head (Abstract, Column 5, Lines 12-25), for the purpose of printing images with stable accuracy (Abstract).

- ***regarding claim 8 and claim 15***, the speed measuring section is configured to compute the velocity of the droplets by using the position of the droplets discharged from the discharge head at two different points in time and using the time difference between these two points in time (Column 5, Lines 12 – 25), for the purpose of printing images with stable accuracy (Abstract).

Yonekubo discloses:

- ***regarding claims 1, 12, 21, 25***, a physical property value acquisition section configured and arranged to acquire physical property values of the droplets discharged from the discharge head, the physical property value acquisition section configured and arranged to acquire at least one of viscosity, surface tension, contact angle, and density as the physical property values of the droplets (Column 3, Lines 52-64; Column 4, Lines 41-56), for the purpose of spouting the desired size of ink droplets from the nozzle

- ***regarding claim 5***, the physical property value acquisition section includes a measuring section that is configured and arranged to measure at least one of physical property of the droplets, (Column 3, Lines 52-64; Column 4, Lines 41-56), for the purpose of spouting the desired size of ink droplets from the nozzle

At the time the invention was made it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Umetani, Arakawa and Yonekubo into the device of Knierim, for the purpose of measuring the amount of ink ejected from the recording head with high accuracy, printing images with stable accuracy and spouting the desired size of ink droplets from the nozzle.

Claims 3 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) as modified by Umetani et al (U.S. Pub. 2003/01935339), Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040) as applied to claim 1 above, and further in view of Iwamura (U.S. Pat. 6,257,687)

Knierim as modified by Umetani, Arakawa and Yonekubo discloses all the claimed limitations above except for the following:

- ***regarding claim 3 and claim 14***, waveform-adjusting section further configured and arranged to correct the basic drive waveform in accordance with a natural period of the discharge head, and adjust the basic drive waveform

Iwamura discloses:

- ***regarding claim 3 and claim 14***, waveform-adjusting section further configured and arranged to correct the basic drive waveform in accordance with a natural period of the discharge head, and adjust the basic drive waveform (Abstract; Column 3, Lines 40 – 46; Column 4, Lines 15 – 36), for the purpose of forming, in a stable manner, fine ink drops while maintaining high efficiency

At the time the invention was made it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Iwamura into the device of Knierim as modified by Umetani, Arakawa and Yonekubo. The motivation for doing so would have been to form, in a stable manner, fine ink drops while maintaining high efficiency.

Claims 9, 11, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) as modified by Umetani et al (U.S. Pub. 2003/01935339), Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040) as applied to claim 1 above, and further in view of Suzuki (U.S. Pub. 2002/0005873)

Knierim as modified by Umetani, Arakawa and Yonekubo discloses

- ***regarding claim 9 and claim 16***, waveform-adjusting section is further configured and arranged to measure a variation in the velocity of the droplets from a plurality of nozzles of the discharge head (Arakawa: Abstract, Column 5, Lines 12-25),
- ***regarding claim 11 and claim 18***, waveform adjusting section of the basic drive waveform so that the weight and velocity of the droplets substantially match the values stored in the condition storage section (Abstract; Column 4, Lines 45-56; Column 5, Lines 36-61; Column 6, Line 65 – Column 7, Line 5)

Knierim as modified by Umetani, Arakawa and Yonekubo does not disclose expressly the following:

- ***regarding claim 9 and claim 16***, waveform-adjusting section configured and arranged to change the drive waveform by using at least one of an early electric

potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head

- configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal
- **regarding claim 11 and claim 18**, waveform adjusting section configured to determine an electric potential VH and an early electric potential VC of the basic drive waveform

Suzuki discloses

- **regarding claim 9 and claim 16**, waveform-adjusting section configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head; configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal (Paragraph 0073), for the purpose of improving the ink discharging performance of the discharge head.
- **regarding claim 11 and claim 18**, waveform adjusting section configured to determine an electric potential VH and an early electric potential VC of the basic drive waveform (Paragraph 0073), for the purpose of improving the ink discharging performance of the discharge head.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Suzuki into the device of Knierim as modified by Umetani, Arakawa and Yonekubo, for the purpose of improving the ink discharging performance of the discharge head.

Claims 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) as modified by Umetani et al (U.S. Pub. 2003/01935339) , Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040) as applied to claim 1 above, and further in view of Matsuo (U.S. Pat. 6,488,349).

Knierim as modified by Umetani, Arakawa and Yonekubo discloses all of the claimed limitations except for the following:

- ***regarding claim 10 and claim 17***, waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal

Matsuo et al discloses

- ***regarding claim 10 and claim 17***, waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal (Column 16, Lines 35 – 48) , for the purpose of improving the ink discharging performance of the discharge head.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Matsuo et al into the device of Knierim as modified by Umetani, Arakawa and Yonekubo, for the purpose of improving the ink discharging performance of the discharge head.

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) as modified by Umetani et al (U.S. Pub. 2003/01935339) , Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040) as applied to claim 21 above, and further in view of Schantz (U.S. Pat. 6,998,230).

Knierim as modified by Umetani, Arakawa and Yonekubo disclose all the claimed limitations above except for the following:

- ***regarding claim 22***, an electrooptical device
- ***regarding claim 23***, electronic equipment equipped with an electrooptical device

Schantz discloses:

- ***regarding claims 22, 23***, electronic equipment equipped with an electrooptical device (Display; Column 10, Lines 37-39; Column 14, Lines 54-60), for the purpose of displaying information concerning the status of the apparatus

At the time the invention was made it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Schantz into the device of Knierim as modified by Umetani, Arakawa and Yonekubo, for the purpose of displaying information concerning the status of the apparatus

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Knierim (U.S. Pat. 5,502,468) as modified by Umetani et al (U.S. Pub. 2003/01935339) , Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040) as applied to claim 21 above, and further in view of Weksler (WO 02/090119)

Knierim as modified by Umetani, Arakawa and Yonekubo discloses all the claimed limitations except for the following:

- ***regarding claim 24***, the speed measuring section has a camera and a strobe light

Weksler discloses:

- ***regarding claim 24***, the speed measuring section has a camera and a strobe light (Figure 12; Page 21, Line 21 – Page 22, Line 14), for the purpose of calibrating the apparatus

At the time the invention was made it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of Weksler into the device of Knierim as modified by Umetan, Arakawa and Yonekubo, for the purpose of adjusting droplet size and vibration frequency

Response to Arguments

Applicant's arguments with respect to claims 1-3, 5-18, 21-25 have been considered but are moot in view of the new ground(s) of rejection.

The combination of the references (Knierim, Umetani, Arakawa and Yonekubo) provides benefits for measuring the physical property values of the droplets discharged from the discharge head (for example: measuring with high accuracy; printing with stable accuracy; and spouting the desired size of ink droplets). Please see the above rejection regarding Knierim (U.S. Pat. 5,502,468) in view of Umetani et al (U.S. Pub. 2003/01935339), Arakawa et al (U.S. Pat. 6,843,548) and Yonekubo et al (U.S. Pat. 6,331,040).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Uhlenhake whose telephone number is (571) 272-5916. The examiner can normally be reached on Monday - Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JASON S UHLENHAKE/
Examiner, Art Unit 2853

/Julian D. Huffman/
Primary Examiner, Art Unit 2853